

SIPMOS[®] Small-Signal-Transistor

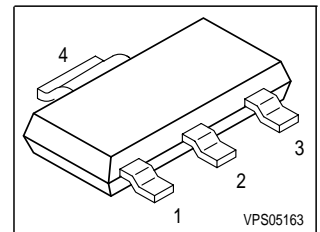
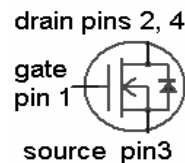
Features

- N-Channel
- Enhancement mode
- Avalanche rated
- Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21



Product Summary

Drain source voltage	V_{DS}	60	V
Drain-Source on-state resistance	$R_{DS(on)}$	0.09	Ω
Continuous drain current	I_D	2.6	A



Type	Package	Tape and Reel	Marking	Packaging
BSP318S	PG-SOT223	H6327: 1000 pcs/r	BSP318S	Non dry

Maximum Ratings, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current	I_D	2.6	A
Pulsed drain current $T_A = 25\text{ °C}$	$I_{D\text{ puls}}$	10.4	
Avalanche energy, single pulse $I_D = 2.6\text{ A}$, $V_{DD} = 25\text{ V}$, $R_{GS} = 25\text{ }\Omega$	E_{AS}	60	mJ
Avalanche current, periodic limited by T_{jmax}	I_{AR}	2.6	A
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	0.18	mJ
Reverse diode dv/dt $I_S = 2.6\text{ A}$, $V_{DS} = 20\text{ V}$, $di/dt = 200\text{ A}/\mu\text{s}$, $T_{jmax} = 150\text{ °C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_A = 25\text{ °C}$	P_{tot}	1.8	W
Operating and storage temperature	T_j, T_{stg}	-55... +150	°C
IEC climatic category; DIN IEC 68-1		55/150/56	
ESD Class JESD22-A114-HBM		Class 1b	

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point (Pin 4)	R_{thJS}	-	17	-	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾	R_{thJA}	- -	100 -	- 70	

Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain- source breakdown voltage $V_{GS} = 0\text{ V}$, $I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	60	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = 20\text{ }\mu\text{A}$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ °C}$ $V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 150\text{ °C}$	I_{DSS}	- -	0.1 -	1 100	μA
Gate-source leakage current $V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	-	10	100	nA
Drain-Source on-state resistance $V_{GS} = 4.5\text{ V}$, $I_D = 2.6\text{ A}$	$R_{DS(on)}$	-	0.12	0.15	Ω
Drain-Source on-state resistance $V_{GS} = 10\text{ V}$, $I_D = 2.6\text{ A}$	$R_{DS(on)}$	-	0.07	0.09	

¹Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 2.6\text{ A}$	g_{fs}	2.4	5.5	-	S
Input capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	300	380	pF
Output capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	90	120	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	50	65	
Turn-on delay time $V_{DD} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 2.6\text{ A}$, $R_G = 16\ \Omega$	$t_{d(on)}$	-	12	20	ns
Rise time $V_{DD} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 2.6\text{ A}$, $R_G = 16\ \Omega$	t_r	-	15	25	
Turn-off delay time $V_{DD} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 2.6\text{ A}$, $R_G = 16\ \Omega$	$t_{d(off)}$	-	20	30	
Fall time $V_{DD} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 2.6\text{ A}$, $R_G = 16\ \Omega$	t_f	-	15	25	

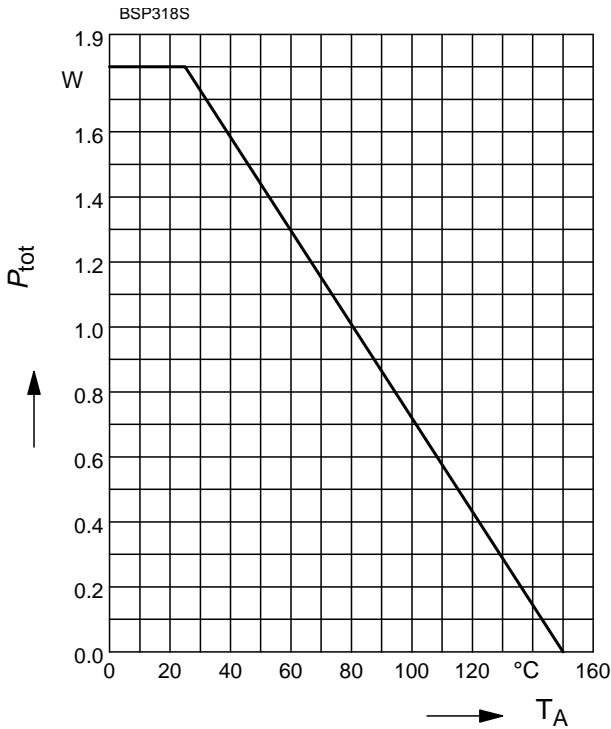
Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate charge at threshold $V_{DD} = 40\text{ V}$, $I_D = 0.1\text{ A}$, $V = 1\text{ V}$	$Q_{G(th)}$	-	0.4	0.6	nC
Gate charge at $V_{GS} = 5\text{ V}$ $V_{DD} = 40\text{ V}$, $I_D = 2.6\text{ A}$, $V_{GS} = 0\text{ to }5\text{ V}$	$Q_{g(5)}$	-	7	10	
Gate charge total $V_{DD} = 40\text{ V}$, $I_D = 2.6\text{ A}$, $V_{GS} = 0\text{ to }10\text{ V}$	Q_g	-	14	20	
Gate plateau voltage $V_{DD} = 40\text{ V}$, $I_D = 2.6\text{ A}$	$V_{(plateau)}$	-	3.6	-	V

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current $T_A = 25\text{ °C}$	I_S	-	-	2.6	A
Inverse diode direct current,pulsed $T_A = 25\text{ °C}$	I_{SM}	-	-	10.4	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$, $I_F = 5.2\text{ A}$	V_{SD}	-	0.95	1.2	V
Reverse recovery time $V_R = 30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	t_{rr}	-	50	75	ns
Reverse recovery charge $V_R = 30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	0.1	0.15	μC

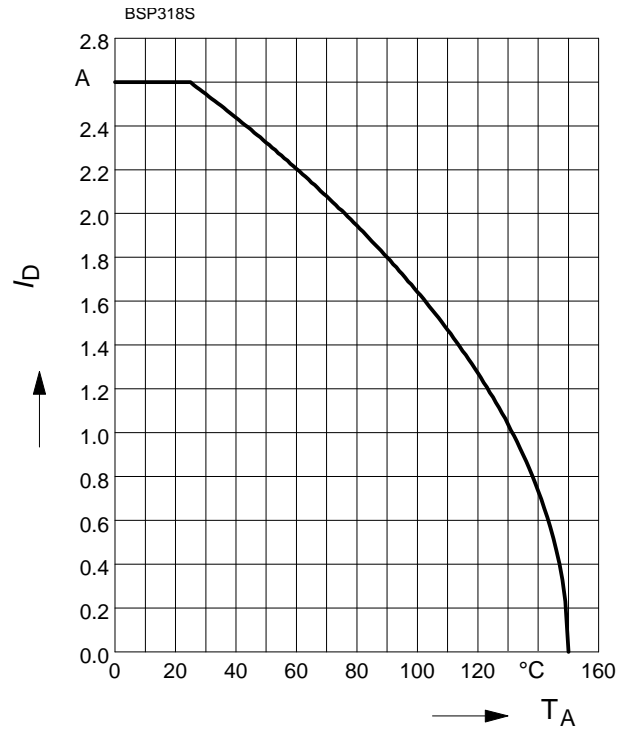
Power Dissipation

$$P_{tot} = f(T_A)$$



Drain current

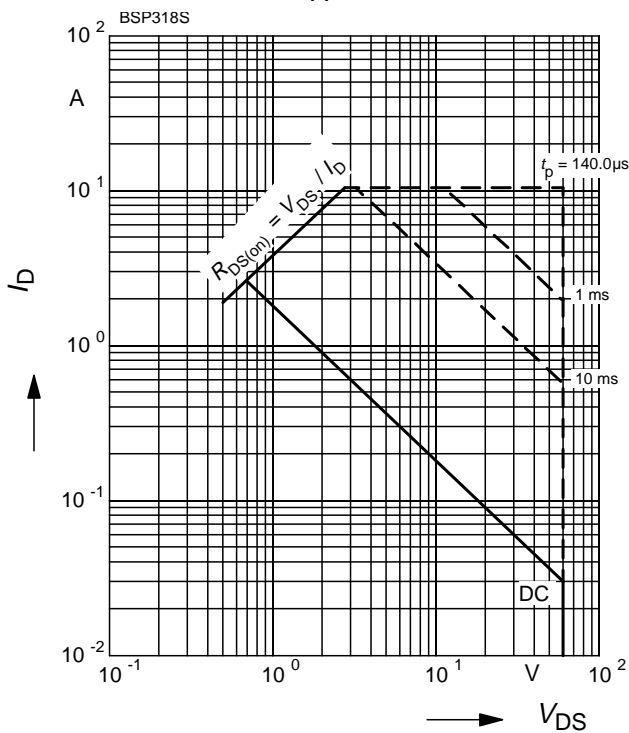
$$I_D = f(T_A)$$



Safe operating area

$$I_D = f(V_{DS})$$

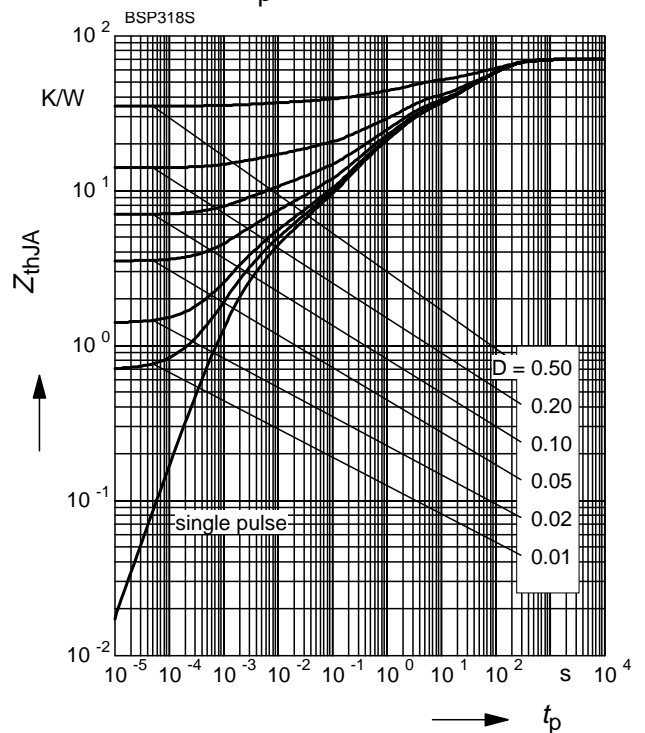
parameter : $D = 0$, $T_A = 25\text{ °C}$



Transient thermal impedance

$$Z_{thJA} = f(t_p)$$

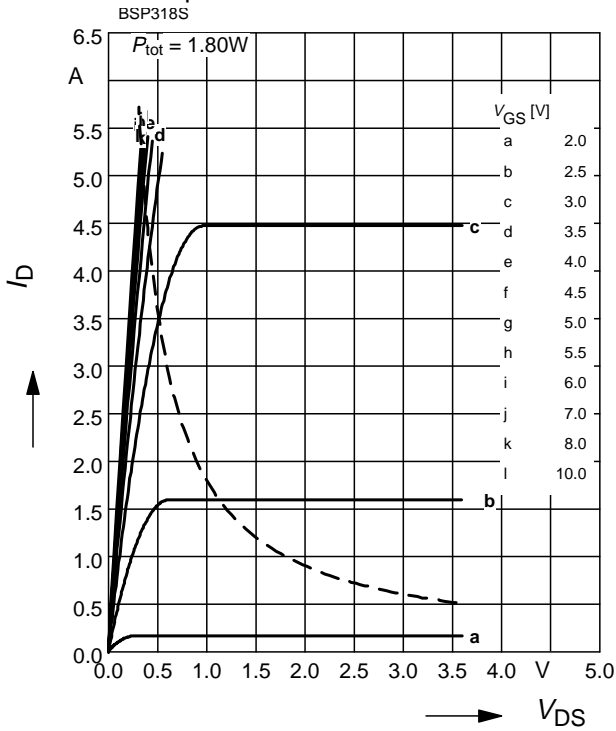
parameter : $D = t_p/T$



Typ. output characteristic

$I_D = f(V_{DS}); T_j = 25^\circ\text{C}$

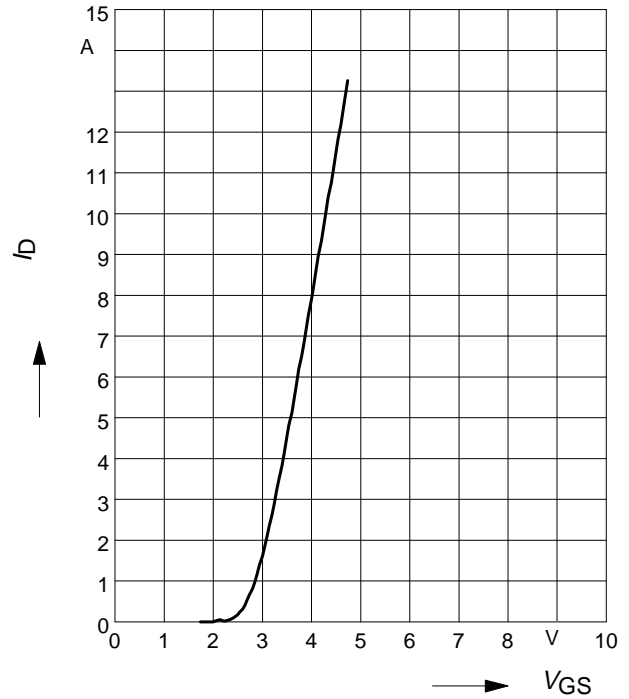
parameter: $t_p = 80 \mu\text{s}$



Typ. transfer characteristics $I_D = f(V_{GS})$

$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$

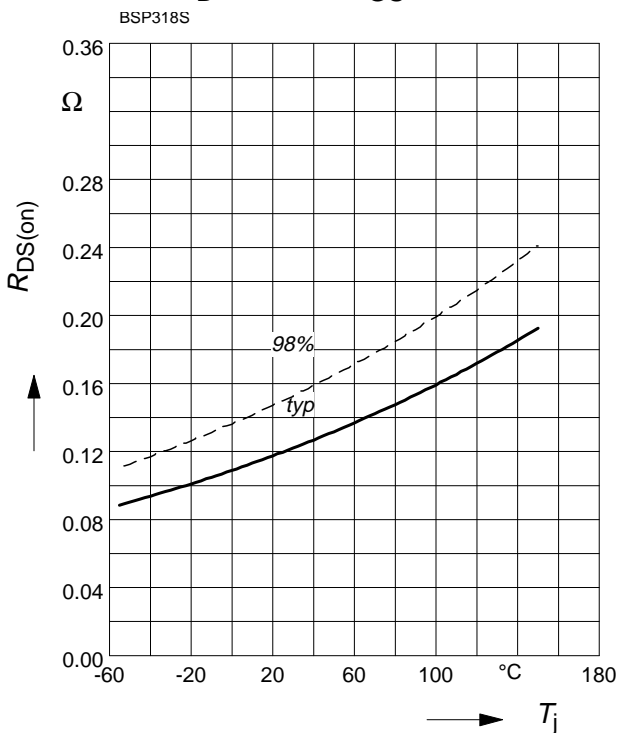
parameter: $t_p = 80 \mu\text{s}$



Drain-source on-resistance

$R_{DS(on)} = f(T_j)$

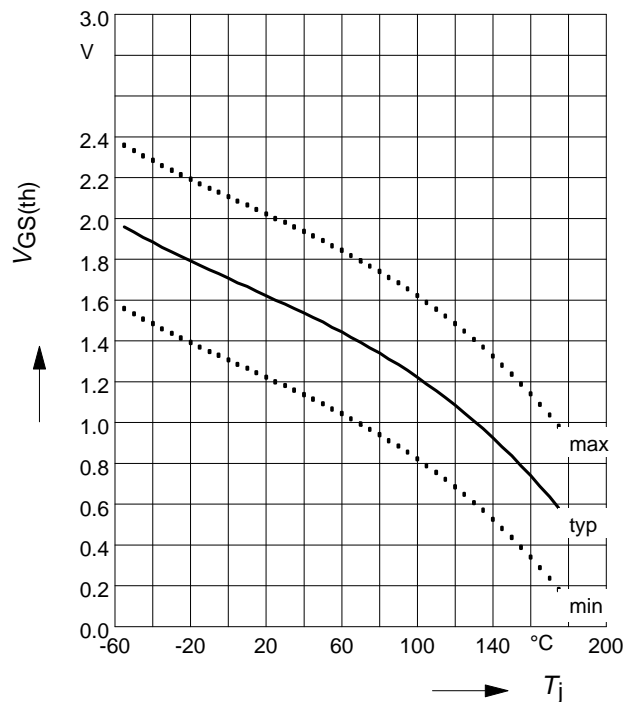
parameter: $I_D = 2.6 \text{ A}, V_{GS} = 4.5 \text{ V}$



Gate threshold voltage

$V_{GS(th)} = f(T_j)$

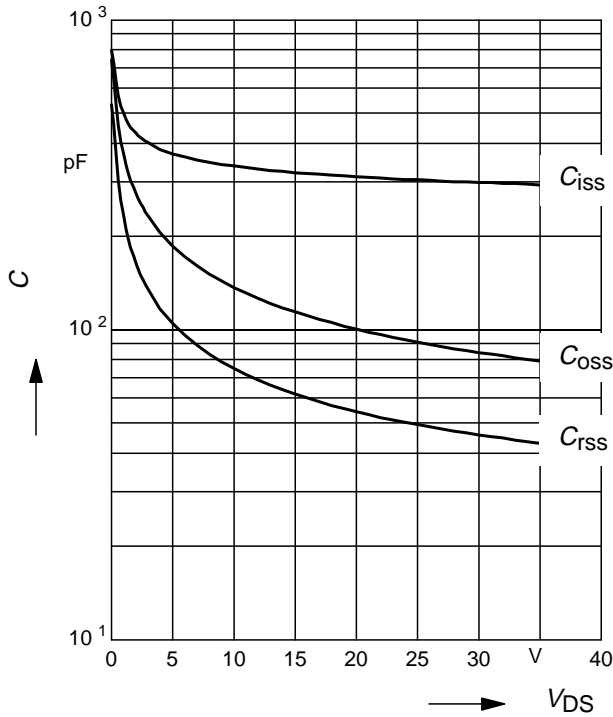
parameter: $V_{GS} = V_{DS}, I_D = 20 \mu\text{A}$



Typ. capacitances

$C = f(V_{DS})$

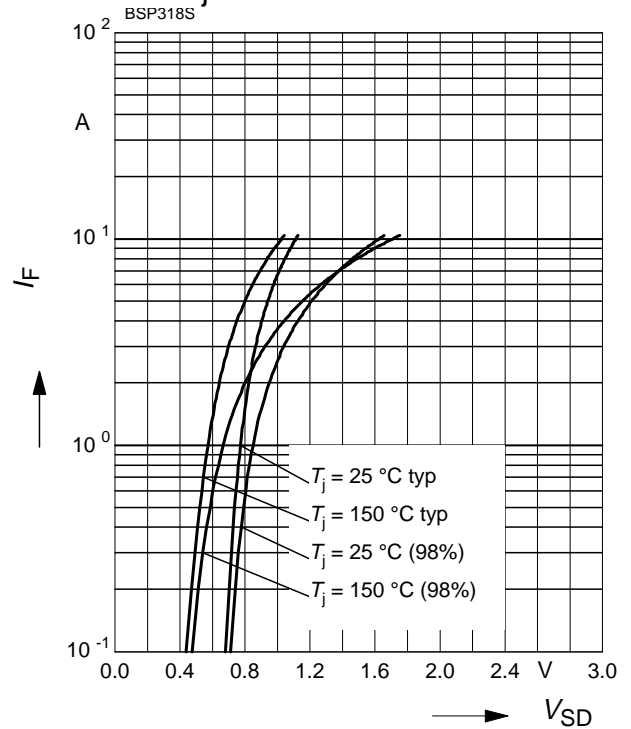
parameter: $V_{GS}=0\text{ V}$, $f=1\text{ MHz}$



Forward characteristics of reverse diode

$I_F = f(V_{SD})$

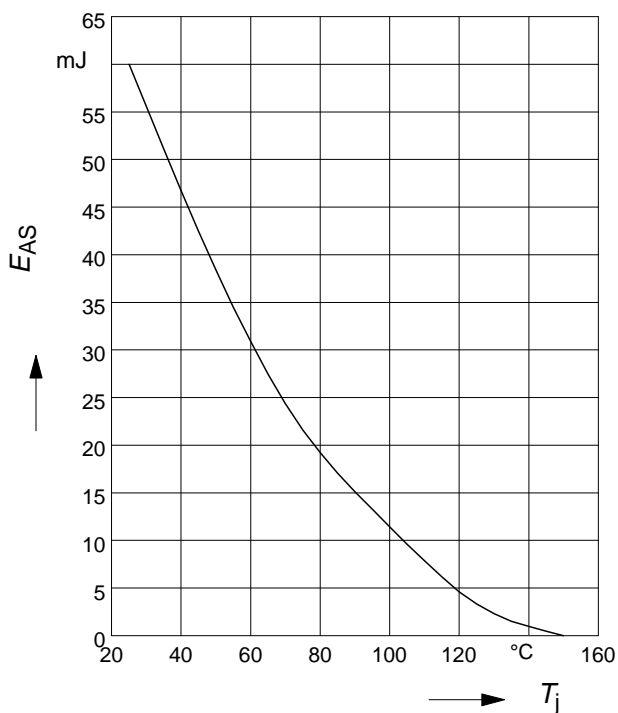
parameter: T_j , $t_p = 80\ \mu\text{s}$



Avalanche Energy $E_{AS} = f(T_j)$

parameter: $I_D = 2.6\text{ A}$, $V_{DD} = 25\text{ V}$

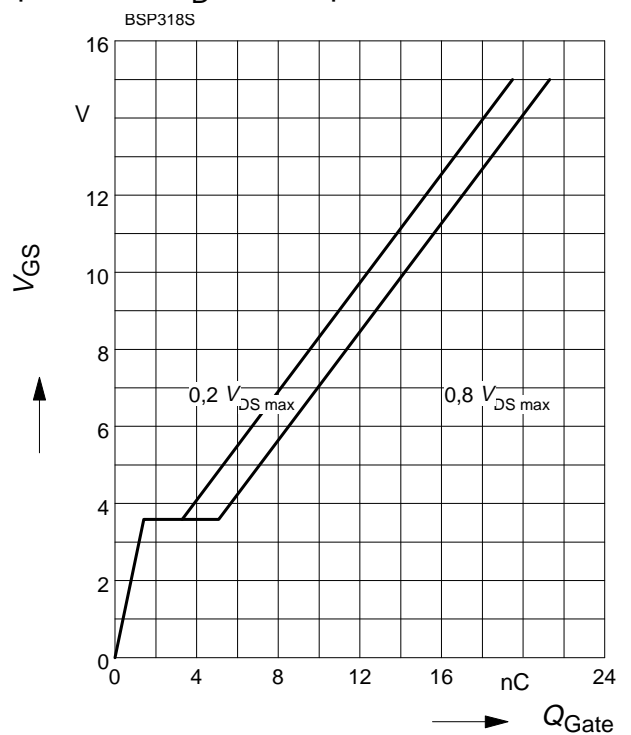
$R_{GS} = 25\ \Omega$



Typ. gate charge

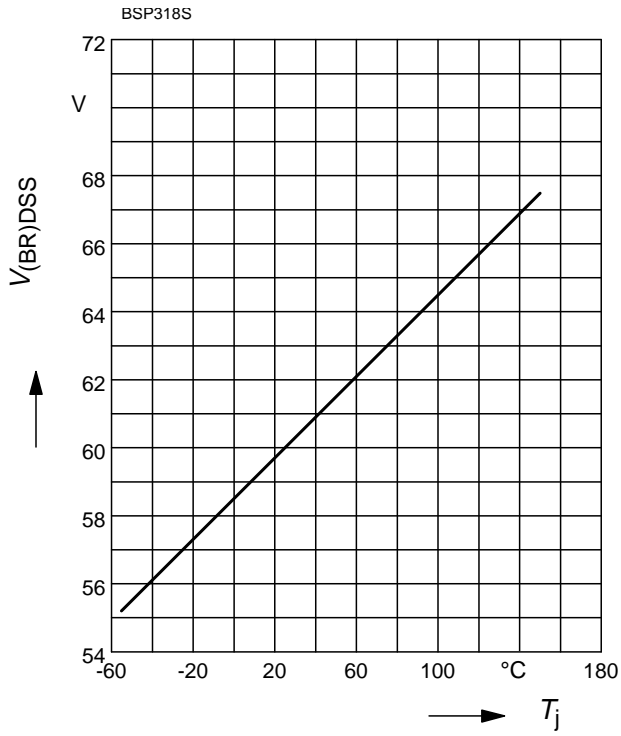
$V_{GS} = f(Q_{Gate})$

parameter: $I_D = 2.6\text{ A pulsed}$



Drain-source breakdown voltage

$$V_{(BR)DSS} = f(T_j)$$



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